

# Schedule

## Week 1 (09/07-9/11)

- Day 1
  - Introduction to Theory of Computation<sup>1</sup>
  - Introduction to OCAML<sup>2</sup>
  - Assignment 1<sup>3</sup>
- Day 2
  - OCAML basics<sup>4</sup>
- Day 3
  - OCAML basics (cont)<sup>5</sup>
- Day 4
  - OCAML basics (cont)<sup>6</sup>
  - OCAML example: sets as lists (optional)<sup>7</sup>

## Week 2 (09/14-09/18)

- Day 1
  - Alphabets, strings, substrings, empty string, lexicographic ordering<sup>8</sup>
  - Alphabet and friends in OCAML<sup>9</sup>
- Day 2
  - Languages, examples, constructions<sup>10</sup>
- Day 3
  - Languages, examples, constructions<sup>11</sup>
- Day 4
  - Deterministic Finite Automata<sup>12</sup>

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<sup>1</sup>[notes/theory\\_intro.html](#)

<sup>2</sup>[notes/ocaml\\_intro.html](#)

<sup>3</sup>[assignments/1.html](#)

<sup>4</sup>[notes/ocaml\\_basics.html](#)

<sup>5</sup>[notes/ocaml\\_basics.html](#)

<sup>6</sup>[notes/ocaml\\_basics.html](#)

<sup>7</sup>[notes/ocaml\\_sets.html](#)

<sup>8</sup>[notes/alphabet.html](#)

<sup>9</sup>[notes/ocaml\\_alphabet.html](#)

<sup>10</sup>[notes/languages.html](#)

<sup>11</sup>[notes/languages.html](#)

<sup>12</sup>[notes/fin\\_aut\\_dfa.html](#)

## Week 3 (09/21-09/25)

- Day 1
  - Deterministic Finite Automata (cont)<sup>13</sup>
- Day 2
  - DFAs in OCAML<sup>14</sup>
- Day 3
  - Regular Languages<sup>15</sup>
  - Union of regular languages is regular<sup>16</sup>
- Day 4
  - Implementation of union in OCAML<sup>17</sup>

## Week 4 (09/28-10/02)

- Day 1
  - Non-deterministic automata, examples
- Day 2
  - Implementation in OCAML
- Day 3
  - DFA equivalent to an NFA
  - Union / Intersection / Star of regular languages is regular
  - Regular Expressions
  - OCAML implementations
  - RegEx -> NFA
  - Nonregular languages
  - Pumping Lemma
  - Examples
  - Catching up
- Day 4
  - Midterm 1

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<sup>13</sup>[notes/fin\\_aut\\_dfa.html](#)

<sup>14</sup>[notes/ocaml\\_dfa.html](#)

<sup>15</sup>[notes/fin\\_aut\\_dfa.html](#)

<sup>16</sup>[notes/fin\\_aut\\_dfa.html](#)

<sup>17</sup>[notes/ocaml\\_dfa.html](#)

## **Week 5 (10/05-10/09)**

- Day 1
  - Context Free Grammars
  - Examples of derivations
- Day 2
  - Programming examples of CFGs
  - Ambiguous grammars
- Day 3
  - Chomsky Normal Forms
- Day 4
  - PushDown Automata definition

## **Week 6 (10/12-10/16)**

- Day 1
  - PDAs more examples
  - OCAML implementation
- Day 2
  - CFG  $\rightarrow$  PDA
- Day 3
  - PDA  $\rightarrow$  CFG
- Day 4
  - Non-context-free grammars
  - Pumping lemma for CFGs

## **Week 7 (10/19-10/23)**

- Day 1
  - Fall Break
- Day 2
  - Brief intro to parsers
- Day 3
  - More on parsers?
- Day 4
  - Turing Machines

## **Week 8 (10/26-10/30)**

- Day 1
  - Turing Recognizable vs Turing Decidable languages
- Day 2
  - Multitape / Nondeterministic Turing machines
- Day 3
  - The Church-Turing thesis, algorithms
- Day 4
  - Decidable Problems, for regular languages

## **Week 9 (11/02-11/06)**

- Day 1
  - The Halting Problem
- Day 2
  - Undecidability of Halting Problem
- Day 3
  - Catching up
- Day 4
  - Midterm 2

## **Week 10 (11/09-11/13)**

- Day 1
  - Reducibility
- Day 2
  - Regularity of languages is undecidable
- Day 3
  - Time Complexity classes
- Day 4
  - The class P

## **Week 11 (11/16-11/20)**

- Day 1
  - The class NP
- Day 2
  - P vs NP, NP-complete problems
- Day 3
- Day 4

## **Week 12 (11/23-11/27)**

- Day 1
- Day 2
  - Thanksgiving Break
- Day 3
  - Thanksgiving Break
- Day 4
  - Thanksgiving Break

## **Week 13 (12/01-12/04)**

- Day 1
- Day 2
- Day 3
- Day 4

## **Week 14 (12/07-12/11)**

- Day 1
- Day 2
- Day 3
- Day 4